XOOLUM™
Application Note

XOOLUM™

So small and so much light!

XOOLUM™

Multi-functional, linear LED luminaire with variable luminaire head

The LED Linear XOOLUM™ is an exceptionally efficient design lamp, which offers enormous modularity and user-friendliness. XOOLUM™ is created from a natural anodised aluminum resulting in a form that matches the function in terms of simplicity. Through the external converter, the light line retains its sleek shape.

Whether indoor or outdoor, office, supermarket, warehouse, production facility or museum - the XOOLUM™ is appropriate for almost any lighting task through the use of seven specially developed optics and excellent LED strips with high color rendering. Available in silver or black profile color as surface-mounted or pendant version. The luminaire head of the multipart system profile is lockable at 45°, enabling more creative and technical lighting freedom.

XOOLUM™ was developed mainly for areas of general and industry lighting and is, thanks to the high efficiency, the ideal solution to realize a sophisticated, energy-saving lighting. The 24V system is available with different controls.

More freedom - The luminaire head of XOOLUM™ can be locked at 45°

XOOLUM™
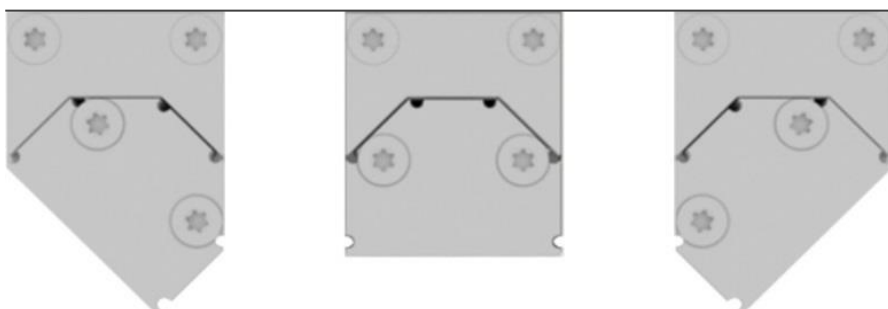
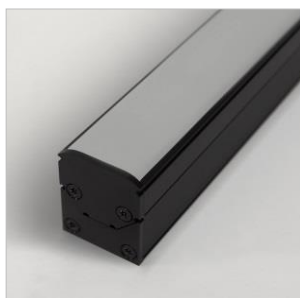## Modular through varied mounting options...

Cove

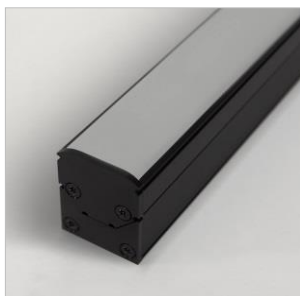Pendant

...in two profile colors

Silver version

Black version

...and seven different optics

VarioCover clear*

VarioCover opal*

VarioCover opal H²*

* Also available in IP67 with internal encapsulation
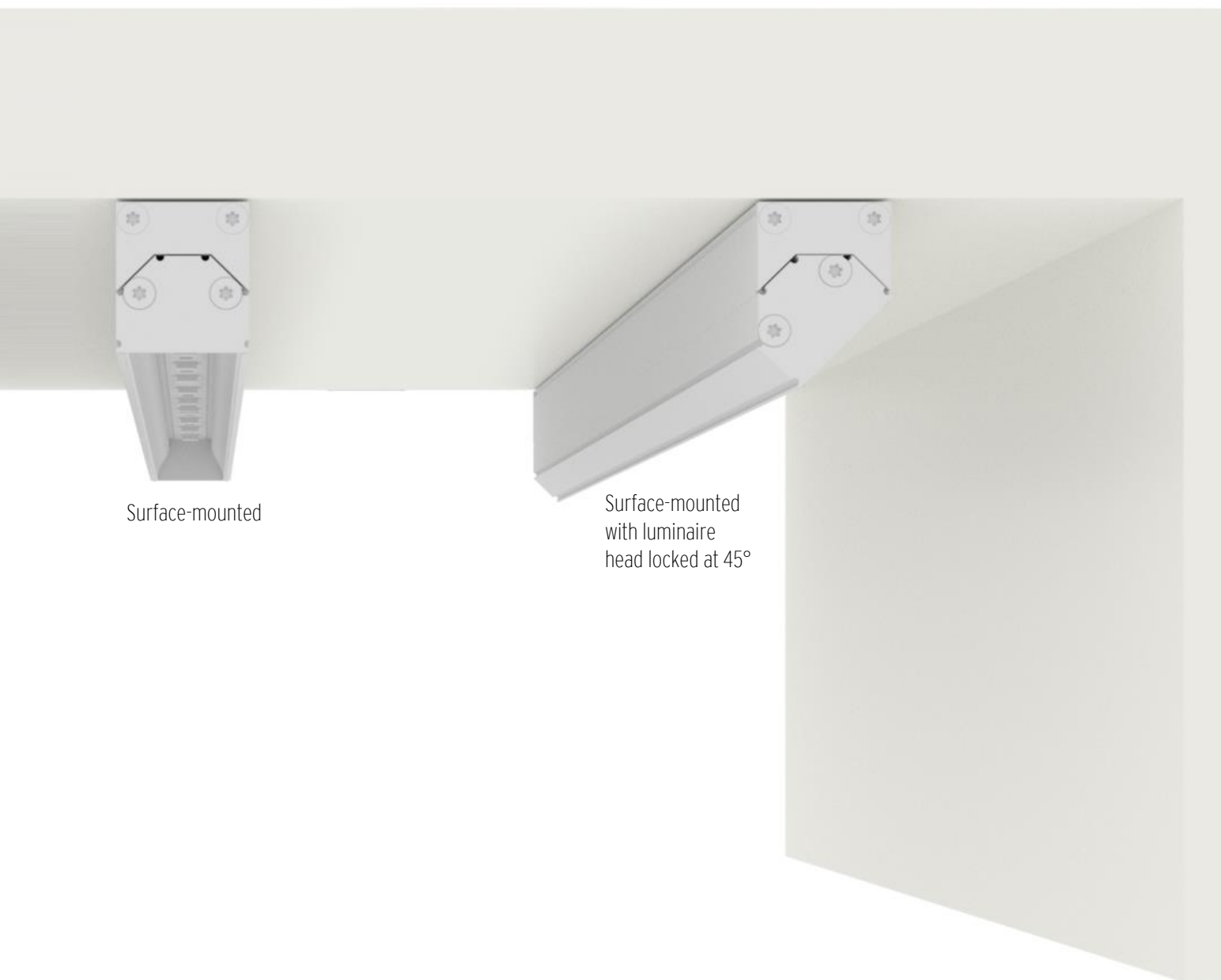
Surface-mounted

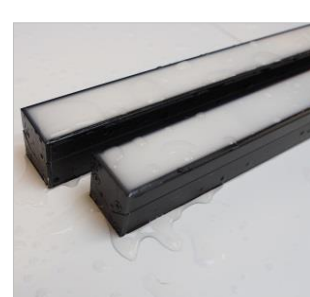Surface-mounted
with luminaire
head locked at 45°

25° Reflector**

65° Reflector**

Reflector Wallwash**

Opal IP67 encapsulation

** Also available in IP67 with clear encapsulation (visible LEDs)

XOOLUM™

Our idea: A symbiosis of design and function

T5 florescent lamp: big form factor and less efficiency

Length of lamp
549 / 849 / 1149 / 1.449 mm
1.80' / 2.78' / 3.77' / 4.75'

T5 High Efficiency (T5 HE)
Power: Ø 25 W/m (Ø 7.62 W/ft)
Luminous flux: Ø 2.244 lm/m (Ø 684 lm/ft)
Efficiency: Ø 90 lm/W

T5 High Output (T5 HO)
Power: Ø 48 W/m (Ø 14.6 W/ft)
Luminous flux: Ø 3.739 lm/m (Ø 1,140 lm/ft)
Efficiency: Ø 78 lm/W

XOOLUM™: small form factor and convincing efficiency

Length of luminaire
72,5 mm - 4010 mm
0.24' - 13.16'

32% more efficient than T5 HE

37% more efficient than T5 HO
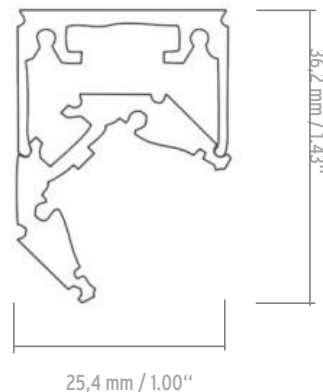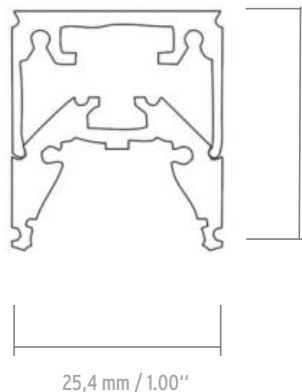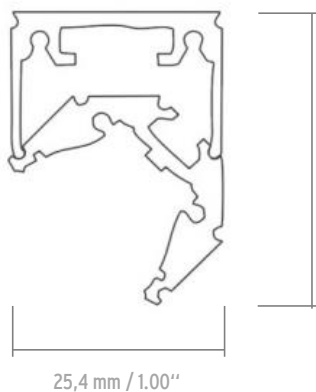
XOOLUM HYDRA LD15
Power: 15 W/m (4.57 W/ft)
Luminous flux: 2.000 lm/m* (609 lm/ft*)
Efficiency: ~ 133 lm/W*

XOOLUM HYDRA LD25
Power: 25 W/m (7.62 W/ft)
Luminous flux: 3.100 lm/m (945 lm/ft)
Efficiency: ~ 124 lm/W*

36,2 mm / 1.43"

29,5 mm / 1.16"

36,2 mm / 1.43"

25,4 mm / 1.00"

25,4 mm / 1.00"

25,4 mm / 1.00"

* Based on VarioLED™ Flex HYDRA LD W8:
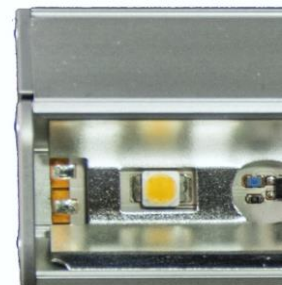
"In developing the XOOLUM™, we wanted to create a modular system, which stands for design, functionality and quality. "Made in Germany" is very important for us and a seal of quality for our customers. Our team of designers, engineers and professionally trained staff "think light" to provide you with the perfect light in a symbiosis of design and function.

From a design point of view XOOLUM™ convinces with formal elegance. It is timelessly modern and combines aesthetics and functionality in an unobtrusive manner. Despite, or perhaps because of formal restraint, each luminaire is a complete unit and consists of no more elements than necessary. The option to lock the luminaire head freely is an especially user-friendly feature. "

Designer and Managing Director of LED Linear GmbH,
Dr. Michael Kramer

reddot design award
best of the best 2012

„So small and so much light"

XOOLUM™
Your benefits – excellent light all along the line

Small form factor

With only 29.5 x 25.4 mm (1.16'' x 1.00'') or 36.2 x 25.4 mm (1.43'' x 1.00'') with luminaire head locked in place at 45°, XOOLUM™ is extremely narrow. It retains its sleek shape also through the external converter.

Convincing efficiency

24V, highly efficient and bright LED tapes of the latest generation. 1.000 lm/m (305 lm/ft) to 5,000 lm/m (1524 lm/ft) @ W850.

Jetzt und in Zukunft

ONE
BIN
ONLY

Today and tomorrow

Unique modularity

Highly modular luminaire profile. The luminaire head is +/- 45° lockable and allows the use of 7 different, specially designed optics.

Easy installation

Easy surface mounting on wall, floor or ceiling through the pre-installation profile. Aesthetic, filigree pendant mounting of the luminaire thanks to a thoughtful, simple pendant system.

LEDsClick™ Profile System

With this LED Linear™ Technology, assembling the luminaire is incredibly easy.

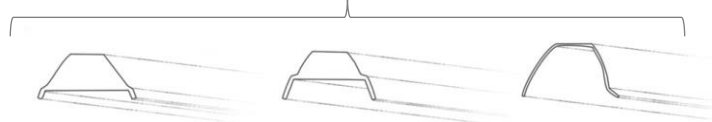**LED Linear Technology LEDsClick™**

Ready for use everywhere through 7 different optics

With these 7 precision-crafted optics, the luminaire can be equipped for the desired application.
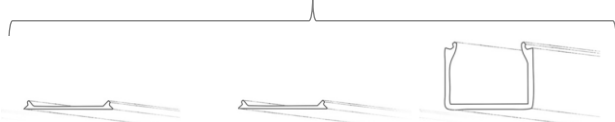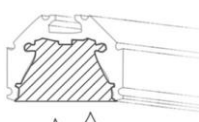
Diffuser optics   Reflector optics   Opal encapsulation

XOOLUM™

A modular toolbox full of possibilities

Through the modular design of XOOLUM™ a variety of lighting configurations can be realized. It is possible to choose between LED strips with different power levels in order to realize lighting tasks in all areas, from ambient to general lighting. In addition, it is possible to select between eight color temperatures for each LED strip. The tapes with a step length of 62.5 mm / 2.45" are compatible with the diffuser optics. The tapes with a step length of 125 mm / 4.91" are compatible with the reflector-optics. All XOOLUM™ lighting configurations are also available in the encapsulated IP67 variant. At the diffuser optics the clear encapsulation can be found inside, under the optic, while at the reflector optics the clear encapsulation is on the outside on the optics, so that the LEDs remain visible. Another possibility is an opal IP67 encapsulation, this represents a further optic and offers an absolutely homogeneous light emitting surface throughout entire length of the luminaire.

All information on the LED strips shown below and on the other strips (IQ White, RGB, color) can be found on page 34 of this application note.

Step length 62.5 mm / 2.45"
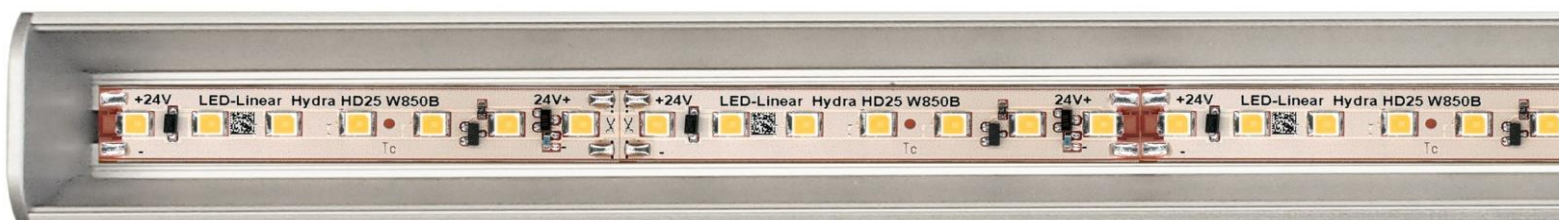
62,5 mm / 2.45"

Step length 125 mm / 4.91"
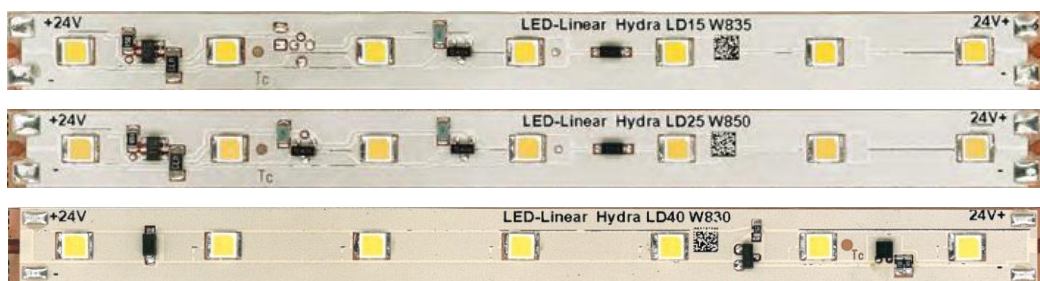
125 mm / 4.91"

The tapes shown on the left with a step measurement of 62.5 mm / 2.45" can be combined with the three following diffuser optics:

VarioCover clear
η = 85 %

VarioCover opal
η = 65%

VarioCover opal H²
η = 62%
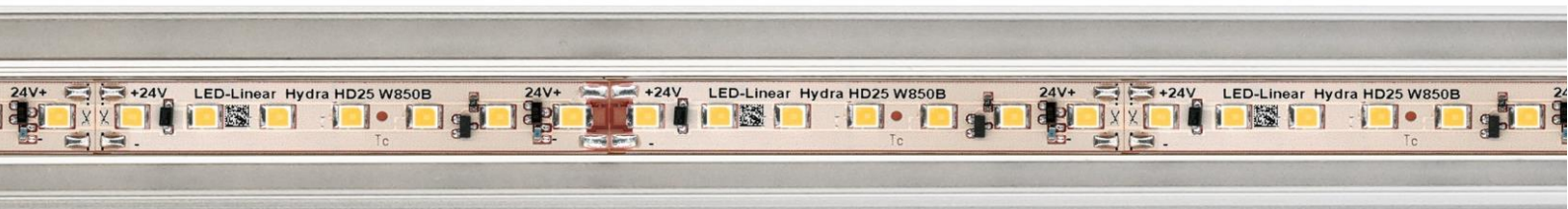
The tapes shown on the left with a step measurement of 125 mm / 4.91" can be combined with the three following reflector optics:

Reflector 25°
η = 93%

Reflector 65°
η = 93%

Reflector Wallwasher
η = 94%

XOOLUM™

7 different optics allow the use everywhere – from production to executive office

Diffuser optics
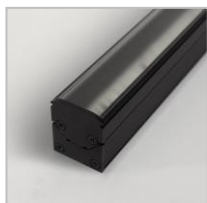
VarioCover clear,
Narrow, clear PMMA design cover
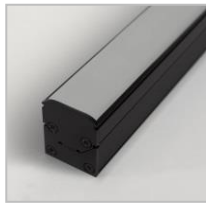
VarioCover opal,
Narrow, opal PMMA design cover

VarioCover opal H²
High, opal PMMA design cover
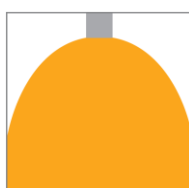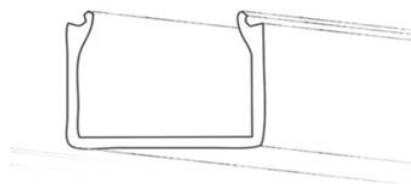
- Wide, slightly deep light distribution for generous illumination of areas

- Average luminance combined with a pleasant, wide illumination

- All around symmetric and wide light distribution for very uniform illumination

- Optimal viewing comfort with absolutely homogeneous light

- All around symmetric and very wide light distribution for particular uniform illumination

- Optimal viewing comfort with absolutely homogeneous light
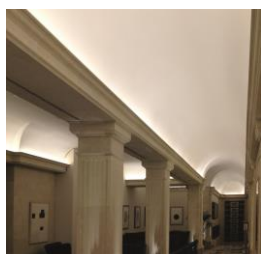
Reflector optics

Dust and water resistant

Aluminum reflector optic
65°

Aluminum reflector optic
25°

Aluminum reflector optic
Wallwash
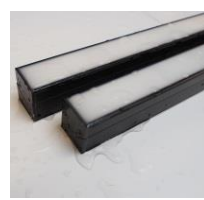
Opal encapsulation
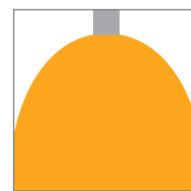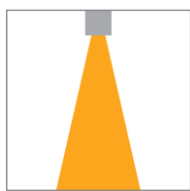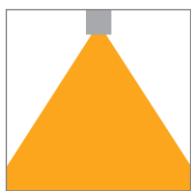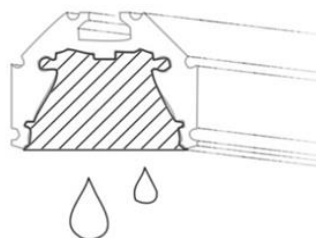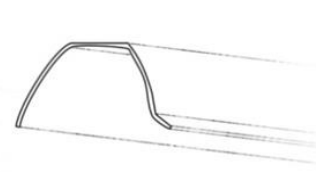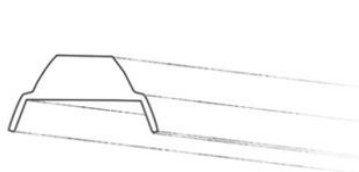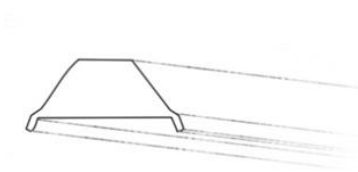
- Wide and deep light distribution (Batwing) for precise and generous illumination of areas
- Pleasant illumination at moderate luminance and directional light
- UGR < 16 through precision-crafted aluminum reflector optic

- Precise, deep light distribution for accurate illumination of areas
- Thorough illumination at high luminance and very directional light
- UGR < 16 through precision-crafted aluminum reflector optic

- Homogeneous distribution of brightness on the wall
- Complete illumination of the wall (height 3.5 m (11.48'); distance 0.5 – 1 m (1.64' – 3.28')
- Precision-crafted aluminum reflector optic

- Absolutely homogeneous light over the entire light emitting surface
- Easy to clean, surface washable
- High resistance in harsh climatic conditions, saltwater, UV, chlorine and solvent resistant

XOOLUM™
…as a production factor
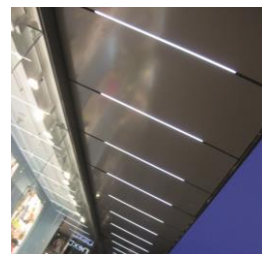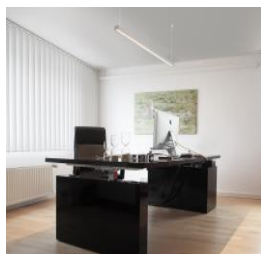
The expectations of luminaires in production facilities are high. For instance, due to the high ceiling, luminaires may be difficult to access for maintenance. Any installed fixture must therefore be extremely durable. With high ceilings, the efficiency plays an important role, as it is essential to produce enough Lux for dealing with different visual tasks on the ground. Depending on the production, luminaires in a factory must withstand heat, cold, humidity, dust or even chemical particles. Robust, low-maintenance and efficient are some of the significant keywords from the requirements for such an application.

When choosing the right luminaire the human element is also extremely important. Not only the luminaires should be effective, but also the employees. In many industrial companies the work day is very long and often contains two or three shifts. The right light in a production hall is very important because it can affect the willingness to perform, motivation, and especially the concentration of the humans. Through the use of advanced light technology optimum conditions for effective work can be realized from the early to the night shift. Thus, the error-free management of the visual task is in the focus of lighting design. With increasing illumination levels smaller details are more visible and the number of accidents will decrease. This increases the safety in the workplace and the employees feel more comfortable.

LED Linear™ offers this flexibility with XOOLUM™. With different diffuser and reflector optics or a closed luminaire with IP67 protection, the basis for the management of various visual tasks is also given as the protection against external influences. High efficiency, good color rendering, long life and excellent thermal management characterize XOOLUM™. Thus the luminaire is an excellent choice for the application in the industry and production.

Not only is the selection of the proper luminaire important – but also the proper arrangement. When equipping the production facility with XOOLUM™, LED strips, spacing between luminaires and optics had to be carefully chosen in order to obtain the necessary lighting levels. The consequences of improper planning are reflected among other things in glare, uneven illumination and high energy consumption.

Production hall

- Size: 202 qm
- Height: 3 m (9.84')
- Mounting height of the luminaires: 3 m (9.84')
- Maintenance factor: 0,78
- Lighting task: Illumination of the work tables

Used luminaire: XOOLUM R HYDRA LD25

- Mounting: Surface-mounted
- Length: 1.510 mm (4.95')
- Optic: Reflector optic 65°
- LED tape: HYDRA LD25
- Light color: 4,000 K
- Color rendering index: CRI 85
- Power: 41,2 Watt incl. power loss of the PSU
- Lumen: 4,950 lm
- Life time: > 60.000 hours
- Efficiency: 120 lm/W

Aluminum reflector optic 65°
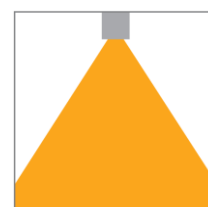
Illumination of work tables in the production hall

Amount = 5 tables
Length = 9 m (29.57')
Width = 1,2 m (3.93')
Level of use and work surface = 1 m (3.28')
Required illuminance on the working surface = 750 lx
Required uniformity = 0,7

Lighting renovation with LED technology – XOOLUM compared to T5

15,96 W/m² (4.86 W/ft)

only 4,89 W/m² (1.49 W/ft)
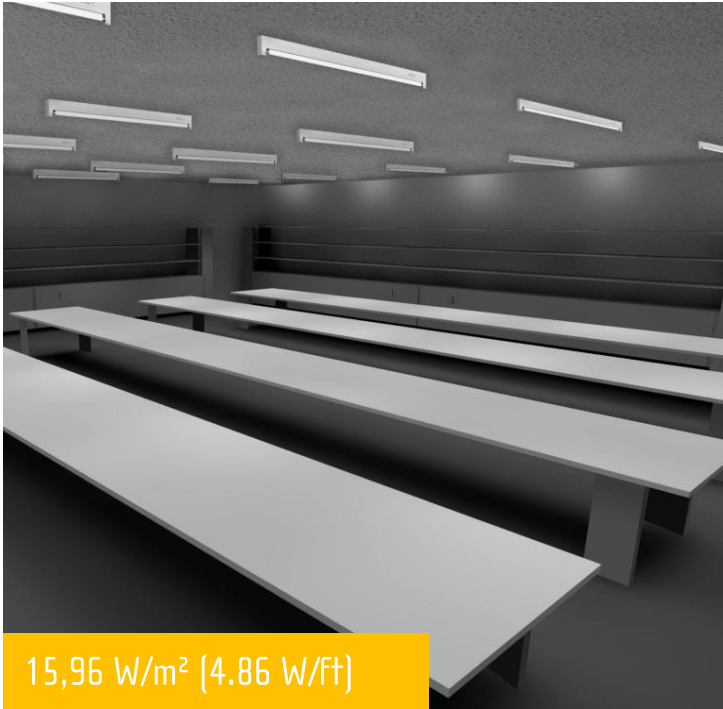
Old system with T5

Number of luminaires:	54 pieces
Power per area:	15,96 W/qm
Efficiency:	62,68 lm/W
Lifetime:	20.000 h
Annual energy consumption:	23.535 kWh/a
Annual energy costs:	5.884,00 €*/a
	(7.120,52 $*/a)

*0,25 €/kWh*20h/day lighting time*
*0.30 $/kWh*20h/day lighting time*

New system with XOOLUM HYDRA LD25 and 65° reflector optics

Number of luminaires:	24 pieces
Power per area:	4,89 W/qm
Efficiency:	120,14 lm/W
Lifetime:	60.000 h
Annual energy consumption:	7.218 kWh/a
Annual energy costs:	1.805,00 €*/a
	(2.020,34 $*/a)
Energy savings to T5:	16.317 kWh/a
Cost savings to T5:	4.079,00 €/a
	(4.566,24 $/a)
= Savings:	**69 %**

Savings
69%

Plan view of the production hall

Isolines in the entire production hall
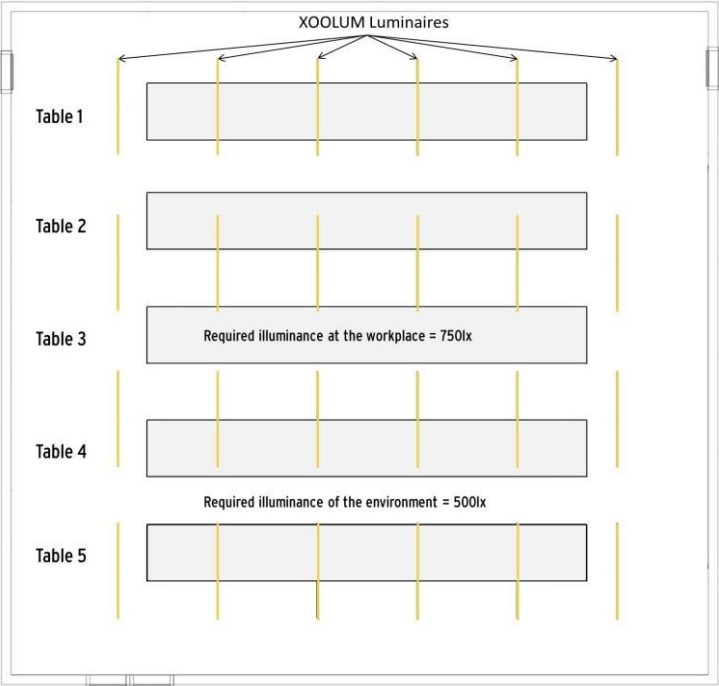
The figure shows the plan view the illuminated production hall. The 24 used XOOLUM™ luminaires were drawn in yellow The required illuminance at the workplace is 750 lx, the required illuminance in the iurroundings is 500 lx.
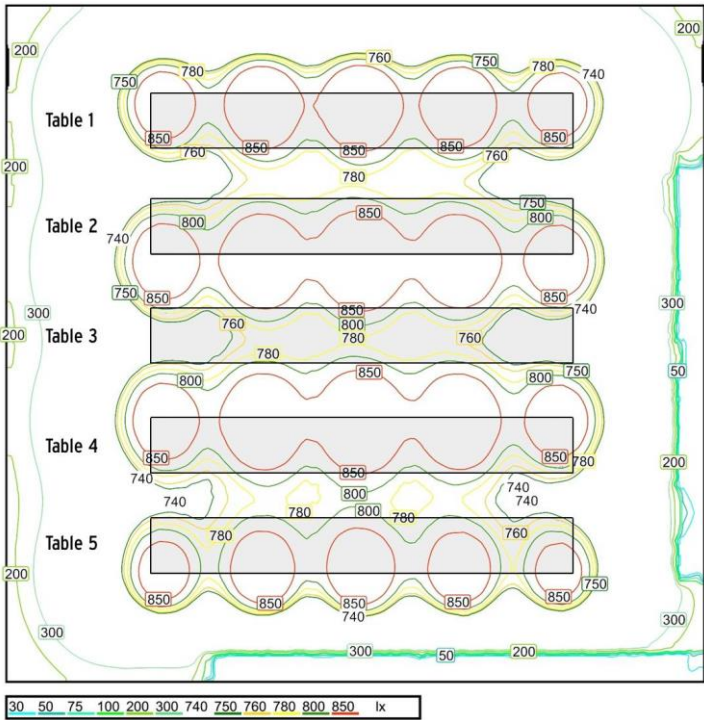
The figure shows the status of the illuminance levels based on isolines, when using the XOOLUM™ within the assessment space. Isolines indicate the achieved illuminance levels in the areas in which a light calculation was performed.

Benefits over T5

- Perfect, targeted illumination of the workplace by precise reflector optics. This requires up to 60% less luminaires.
- Natural colors and optimum vision for every type of production work at CRI 85
- Fulfillment of all high production requirements at incredible efficiency
- Very easy to install
- Protected against dust (IP40 and IP67)
- Protected against water and water vapor (IP67)
- Extremely low maintenance (maintenance factor 0.8)
- shock resistant
- Freely scalable thanks to modular design, no established lengths
- Maximum light output with powerful LED technology
- Free of hazardous substances such as mercury

Achieved illuminance levels
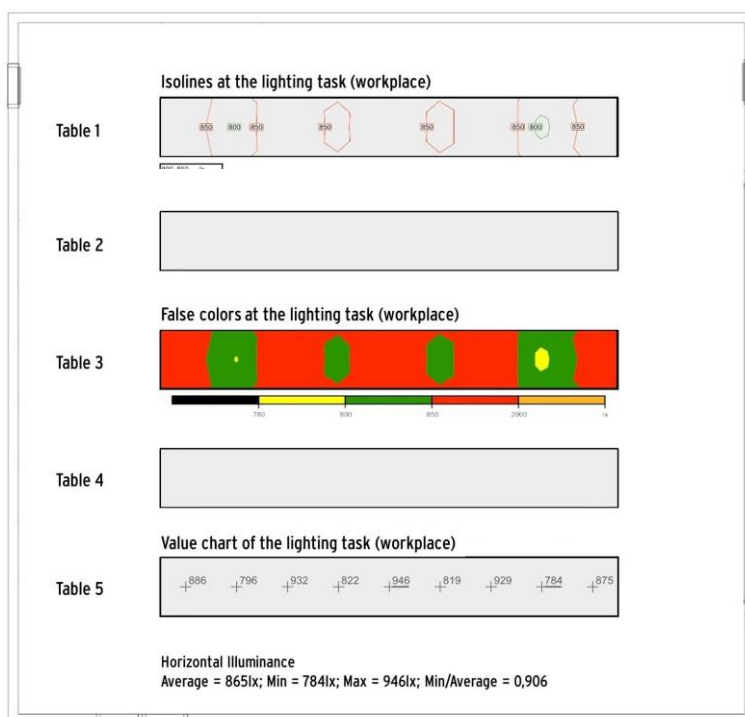
Conclusion:
It is apparent from the figure showing the isolines in the entire production hall that the required illuminance of 750 lx at a required uniformity from 0.7 (Min/Average) is achieved in the whole range of the lighting task.

The shown images characterize the achieved illuminance levels in the areas of lighting task.

XOOLUM™
...as a motivating factor

High performance in everyday office life does not mean that the energy consumption for lighting must increase too. XOOLUM™ meets your needs, reduces your energy consumption and significantly increases your comfort and that of your employees.

In the everyday office life the human being is an irreplaceable resource that should be at the center of the action. Scientific studies have shown that light has a non-negligible effect on us humans. Warm white light has a calming effect and cold white light has an activating effect. The concentration ability, motivation and commitment of the people can thereby be increased.

From these realizations as well as our extensive know-how in lighting technology, we set high standards for our lighting solutions to facilitate your everyday life a little bit. Through specially designed reflector optics our luminaire system achieves a Unified Glare Rating (UGR) of less than 16 and thus a perfect glare control at absolutely homogeneous illumination of the workstation. A photometric properly aligned and high quality lighting always guarantees you a high operating comfort and also improves the quality of your workplace.

Executive workplace

• Workplace:	1m x 2m (3.28' x 6.56')
• Room height:	3 m (9.84')
• Light spot height:	1,2 m (3.93')
• Maintenance factor:	0,8
• Required illuminance:	500 lux
• Required uniformity:	0,6

Used luminaire: XOOLUM R HYDRA LD15

• Mounting:	Pendant
• Length:	1,385 mm (4.54')
• Optic:	Reflector optic 65°
• LED tape:	HYDRA LD15
• Light color:	3,500 K
• Color rendering index:	CRI 85
• Power:	23.4 W
• Lumen:	2,761 lm
• Life time:	> 60,000 hours
• Efficiency:	117.99 lm/W

Aluminum reflector optic 65°
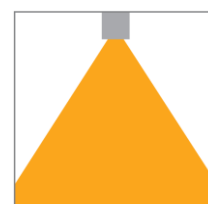
Lighting renovation with LED technology – XOOLUM compared to T5

T5 luminaire

Luminaire length	1,340 mm (4.39')
Light power	28 W
Luminaire power	56 W*
Luminous flux per luminaire	3,640 lm
Light spot height	1,200 mm (3.94')
Number of luminaires	1
Power total	56 W
Efficiency	65,00 lm/W
Life time	20.000 h
Annual energy consumption	204 kWh/a
Annual energy costs	51 €**/a
	(63 $**/a)

*All information incl. PSU (=Power Supply Unit)
 ** 0.25 €/kWh*10h/day lighting time
 ** 0.31 $/kWh*10h/day lighting time

XOOLUM R HYDRA LD15

Luminaire length	1,385 mm (4.54')
Light power	15,4 W
Luminaire power	23.4 W*
Luminous flux per luminaire	2,761 lm
Light spot height	1,200 mm (3.94')
Number of luminaires	1
Power total	23,40 W
Efficiency	117,99 m/W
Life time	60.000 h
Annual energy consumption	86 kWh/a
Annual energy costs	21,5 €**/a
	(26 $**/a)
Annual energy savings to T5	118 kWh/a
Annual cost savings to T5	29,5 €/a
	(37 $/a)
= Savings	58%

Savings 58%

XOOLUM R HYDRA LD15 IP20

Light spot height to the workplace	
0,6 m	995 lx
0,8 m	866 lx
1,0 m	715 lx
1,2 m	587 lx
1,4 m	485 lx
1,6 m	403 lx
1,8 m	338 lx
2,0 m	286 lx
2,2 m	244 lx

XOOLUM R HYDRA LD25 IP20

0,6 m	1530 lx
0,8 m	1331 lx
1,0 m	1099 lx
1,2 m	902 lx
1,4 m	745 lx
1,6 m	620 lx
1,8 m	520 lx
2,0 m	440 lx
2,2 m	375 lx
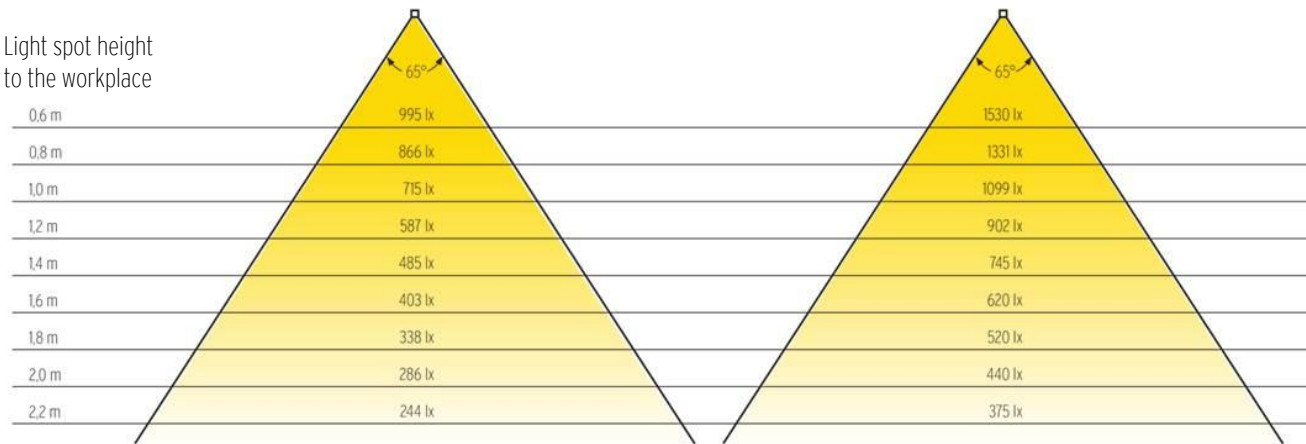
The figure shows the achieved mean illuminance on the executive workplace. Basis of assessment is the respective light spot height for the lighting task.

Benefits over T5

- Pleasant lighting of the workplace through the deep-wide, all-round glare-free light distribution of the 65° reflector optics
- Natural colors thanks to a color rendering of CRI> 85
- Increasing the performance, motivation and concentration of employees through high-quality light
- Extremely high energy savings in the on / off mode
- Extremely low maintenance (maintenance factor 0.8)
- Freely scalable thanks to modular design, no established lengths
- Maximum light output with powerful LED technology
- Free of hazardous substances such as mercury

Isolines at the lighting task (desk)

400 500 540   lx
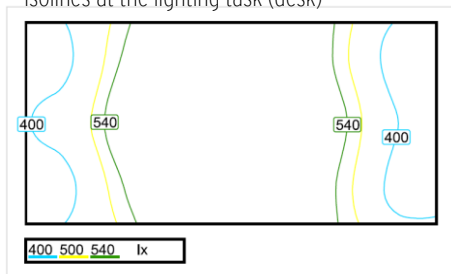
Scale: 1 : 25

False color representation at the lighting task (desk)

350   400   500   540   2000   lx
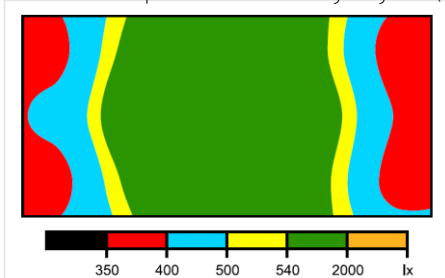
Scale: 1 : 25

Value chart of the lighting task (desk)

+375	+523	+642	+691	+634	+500	+351
+418	+563	+677	+724	+668	+537	+391
+368	+514	+639	+689	+636	+510	+362

Scale: 1 : 25

Conclusion:
It is apparent from the figures on the left that the required illuminance of 500 lx at a required uniformity from 0.6 (Min/Average) is achieved in the whole range of the lighting task.

XOOLUM™
...as enthusiasm factor

When paired with our wall wash reflector optic, the award-winning XOOLUM™ becomes one of the smallest and most efficient wall washers available. Due to the small cross section, the luminaire lines up almost invisibly into your lighting design and offers lighting technology with the highest standards. The XOOLUM™ wall washer delivers high lumen packages of 2,000 lm/m (609 lm/ft), 3,000lm/m (915 lm/ft) or 4,000 lm/m (1.220 lm/ft) at a color rendering of CRI> 85 with a diameter of 25.4 mm x 36 mm (1.00'' x 1.41''). The system is available up to a total length of about 4 m (13') in one piece and thus reduces the often high assembly effort on site.

The luminaire is suitable for many different types of wall washing such as facades, shelves and aisles, vertical retail space in shops, museums and exhibitions, libraries and archives, but also school boards or works of art. Different applications, each with its own requirements. The solution of this task was our aim in the development of the luminaire and makes the XOOLUM™ a truly special luminaire.

The specially designed reflector optic directs the light asymmetrically and very precise on the wall and ensures a completely homogeneous distribution of brightness over the entire wall surface. Whether as a design flood light with clear design for shop and retail, as technical flood light for commerce and industry or as decorative flood light for accent lighting, XOOLUM™ again proves itself as a complete solution.

Benefits:

- Thanks to a small cross section almost invisible and very easy to install
- Absolutely homogeneous and standardized illumination of the entire wall surface or shelf space (height = 3.5 m (11.48')) due to the precise, asymmetric light distribution of the wall-washer optic
- Natural colors thanks to a color rendering of CRI> 85
- Extremely high energy savings and thereby very bright with high efficiency and high quality LED technology
- System life time of about 60,000h (@L80)
- Very low maintenance (maintenance factor 0.8)
- Freely scalable thanks to modular design, no established lengths
- Free of hazardous substances such as mercury

Distance = 1 m (3.28')

$$\frac{Distance}{Height} = \frac{1}{3}$$

Height = 3 m (9.84')

Aluminum reflector optic
Wall washer
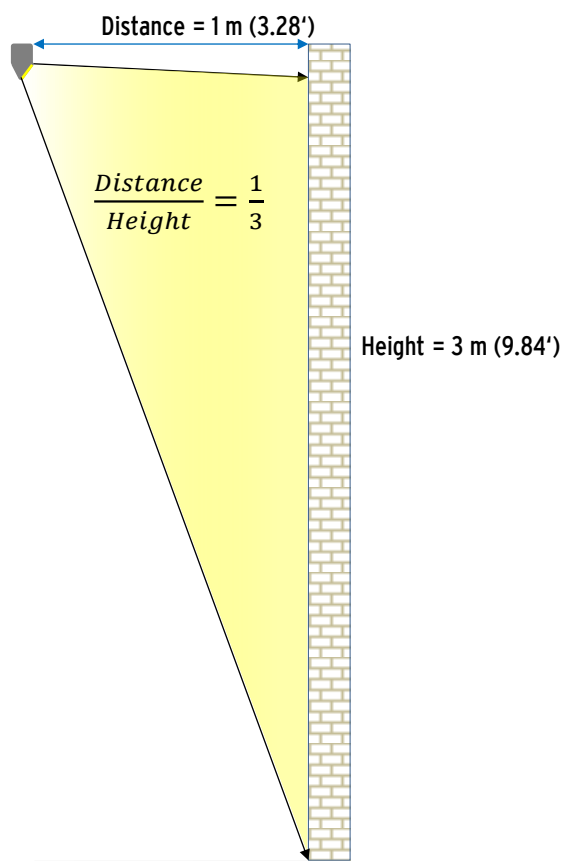
Distance = 1 m (3.28')

Height = 3 m (9.84')

Wall washing starts at the top...

...and is distributed homogenously down

591 lx
684 lx
592 lx
563 lx
649 lx
563 lx
505 lx
578 lx
506 lx
465 lx
526 lx
466 lx
421 lx
471 lx
422 lx
398 lx
428 lx
397 lx

XOOLUM™

A solution for indoor and outdoor use

A specially developed polyurethane encapsulation protects the XOOLUM™ IP67 against a wide variety of environmental influences and makes it an absolute outdoor all-rounder. But also indoors, where protection is essential, such as in commercial kitchens and workshops, this lighting solution shows its advantages. Through the encapsulated surface, the luminaire is, for example, easy to clean, as is necessary in refrigerated counters. Thus it meets the advanced hygiene requirements in these areas.

In IP67, the luminaire has a very high resistance in harsh climatic conditions and is resistant to salt water, chlorine, solvents and UV radiation.

XOOLUM™ is available in different types of protection depending on the choice of optics. In the following we want to give you information on the protection of the optics and a general overview of the types of protection for technical lighting.

Protection classes for XOOLUM™

XOOLUM™ without opticts	= IP00
Reflector optics	= IP20 or IP67 (with clear encapsulation on the outside of the optic)
Diffuser optics	= IP40 or IP67 (with clear encapsulation on the inside of the optic)
Opal encapsulation	= IP67

Protection classes for technical luminaires

Solid object protection according to the first code number

IP0X = Unprotected against solid objects
IP1X = Protection against large solid objects > 50 mm (19.68")
IP2X = Protection against mid-sized solid objects > 12 mm (0.47")
IP3X = Protection against small solid objects > 2,5 mm (0.098")
IP4X = Protection against granular objects > 1 mm (0.0039")
IP5X = Dust protection (ingress of dust not impossible)
IP6X = Dust tight (no ingress of dust)

Moisture protection according to the second code number

IPX0 = Unprotected from moisture
IPX1 = Protection against vertically falling drops of water
IPX2 = Protection against diagonally falling drops of water (up to 15 °)
IPX3 = Protection against spray water
IPX4 = Protection against water splashing from all directions
IPX5 = Protection against water jets
IPX6 = Protection against flooding
IPX7 = Protection during temporary immersion
IPX8 = Protection against submersion

XOOLUM™

Recommendations for other areas of application and material behavior

	XOOLUM with diffuser optics IP40/IP67	XOOLUM with reflector optics IP20/IP67	XOOLUM with opal IP67 encapsulation
Moist areas			
Bakeries	0	-	+
Damp basements	0	-	+
Commercial kitchens	0	0	+
Wet areas			
Bath / shower rooms	0	-	+
Swimming pools	-	-	+
Thermal or saline baths	0	0	+
Dusty areas			
Carpentry / Joinery	-	0	+
Paper processing	+	0	+
Storage for hay, straw, animal feed	-	0	+
Other indoor applications			
Shelf lighting	+	+	-
Shop lighting	+	+	-
Warehouse lighting	+	+	-
Museum lighting	+	+	-
Workplaces (Office)	+	+	-
Education	+	+	-
Corridors	+	+	-
Sport facilities	+	+	-
Hotels	+	+	-
Restaurants	+	+	-
Other outdoor applications			
Facade lighting	-	0	+
Underpasses and Subways	-	0	+
Garage / basement	-	0	+
Bus stop	-	0	+
Tunnels	-	0	+
Train stations	-	0	+

+ suitable
o limited suitable (in IP67)
- unsuitable

	PMMA covers	Miro reflectors	Anodized aluminum
Acetone	-	-	+
Benzene	-	-	+
Fats			
Mineral	+	-	+
Vegetal	+	-	+
Animal	+	-	-
Silicone oil	o	-	+
Chloroform	-	-	+
Diesel fuel	+	-	-
Ethanol			
< 30%	o	+	+
> 30%	-	+	+
Ethyl acetate	-	-	+
Glycerol	+	-	+
Heating oil	o	-	+
Isopropanol	-	-	+
Caustic potash 30%	+	-	-
Cresol	-	-	+
Methanol	-	-	+
Regular gasoline	-	-	+
HCl (hydrochloric acid)			
< 20%	+	-	-
> 20%	+	-	-
Sulfuric acid			
< 50%	+	-	-
< 70%	o	-	-
> 70%	-	-	-
> 98%	-	-	-
Premium gasoline	-	-	+
Toluene	-	-	+
Trichloroethane	-	-	+
Xylene	-	-	+

+ resistant
o limited resistant
- not resistant

XOOLUM™

Accessories - Design in the service of functionality

XOOLUM™ adjustable corner connector set white and black

The XOOLUM™ corner connector set in white to connect two XOOLUM™ profiles. The set includes the corner connector's upper and lower parts, a connecting screw M 4 x 8, a sticker with LED Linear™ Logo, four M3 screws to connect the corner connector to the XOOLUM™ profile, a cable holder and coated 2 m CU/Vz cable (1.35 mm; 0.053″). The corner connector is fully adjustable from 90° to 270°, enabling new creative freedom on the basis of the already modular XOOLUM™ profile.

XOOLUM™ adjustable corner connector set white

Art.-No. : 10000191 - RAL 9003

XOOLUM™ adjustable corner connector set black
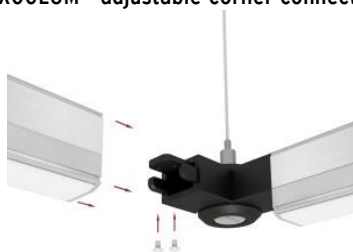
Art.-No. : 10000191 - RAL 9004

XOOLUM™ swivel angle set

XOOLUM™ swivel angle element for floor, wall or ceiling mounting. The angle element is fully adjustable from 0° to 135°. It allows a precise alignment of the XOOLUM™ to the desired lighting task.

Art.-No. : 13000081

3 m (9.84')

1.6 m (5.25')

XOOLUM ™ in use with
white corner connectors

(Measurements: 3m x 1.6 m
(9.84' x 5.25'), in rectangle)

XOOLUM™
Optional control units and protocols

Depending on the used XOOLUM™ luminaire (White, IQ White, RGB) or depending on the desired function of the luminaire, it is necessary to additionally use a control unit for constant voltage supply. This control unit is required to dim the luminaire or to be able to set a color gradient, and operates between constant voltage supply and luminaire.

For more information about these products, please see the LED Linear System Catalogue 2014/2015 starting on page 508 or visit our website http://www.led-linear.com/en/product-overview/system-catalogue/product-line/kategorie/variocontrol/.

24V constant voltage supply	→	Control unit	→	XOOLUM™

Digital systems

DMX

Digital control system which is particularly suitable for RGB and IQ White applications. With this system it is possible to dim luminaires and to set soft color gradients just in the range RGB.

DALI

Digital control system which is suitable especially for White and IQ White applications. With this system it is possible to dim the luminaires and to adjust soft gradients in the range White and IQ White.

Radio control (RF)

Digital control system which is particularly suitable for applications in which a radio control by remote control is required. With this system it is possible to dim luminaires and to adjust soft gradients in the range White, IQ-White and RGB.

Analog systems

1-10V

Analog control system which is suitable for White applications. With this system it is possible to dim luminaires with a potentiometer via a control voltage (SELV).

Switch-DIM

Analog control system which is suitable for White applications. With this system it is possible to dim luminaires using commercially available switches on the mains voltage.

Compatible control units

	Channel quantity	Current I = [A] max. per channel @ 24V	DMX	DALI	Radio control (RF)	1-10V	Switch-DIM
VarioControl DALI/1-10V/SWD slim IP20 Article number: 17000052	1	5		X		X	X
VarioControl LinearDrive 100/A Article number: 16000059	4	1	X	X		X	
VarioControl LinearDrive 180 Article number: 16000057	4	1,5	X			X	
VarioControl LinearDrive 720 Article number: 16000058	4	6	X	X		X	
VarioControl LinearDrive 212D Article number: 17000039	1	8	X			X	
VarioControl LinearDrive 222D Article number: 17000040	2	4	X			X	
VarioControl LinearDrive 220D Article number: 17000038	2	4		X		X	
VarioControl LinearDrive 210D Article number: 17000037	1	8		X		X	
VarioControl RF RGB Master Receiver Article number: 17000045	3	4			X		
VarioControl RF RGB Satellite Receiver Article number: 17000046	3	4			X		
VarioControl RF W Master Receiver Article number: 17000050	3	4			X		
VarioControl RF RGB/W Satellite Receiver Article number: 17000051	3	4			X		
VarioControl RF RGB Remote control wall panel (white) Article number: 17000047	–				X		

XOOLUM™

Electrical connection and power supply

A XOOLUM™ luminaire is normally provided with an open end of the cable to feed the electric current. In order to electrify the XOOLUM™ with **ready, open cable end** proceed as follows:
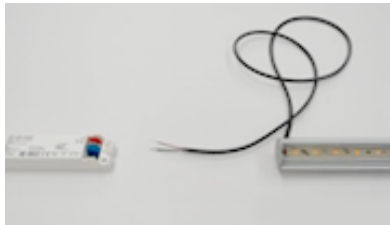
1.
24V, external protection class II constant voltage supply with terminals for connecting the luminaire with open cable ends

2.
Connect the open ends of the cable of the XOOLUM™ luminaire with the terminals of the 24V constant voltage supply. Make sure the wires (+ = red) and (- = black) are connected to the terminal of the corresponding output. Please refer to the datasheet of the power supply

3.
Connect the external 24V constant voltage supply to the mains. Please pay attention to the technical specifications and information given in the datasheet, before connecting the constant voltage supply to the mains

The power supply of XOOLUM™ happens externally via our VarioPSU units. These are operating devices that convert the alternating current (220V AC) into direct current (DC 24V). All LED lamps used in the XOOLUM™ are operated at 24V constant voltage supplies. To ensure the correct and proper operation of the luminaire please use only devices approved by LED linear. In order to ensure the proper operation of the luminaire system (constant voltage supply + luminaire), we dimension the power supplies to the effect that they have at least about 10% more power than the absorbed power of the luminaire. Example: If you want to operate XOOLUM™ luminaires with a total power consumption of 90 watts, use an operating device with a minimum output of 99 watts here.

Compatible PSU units:

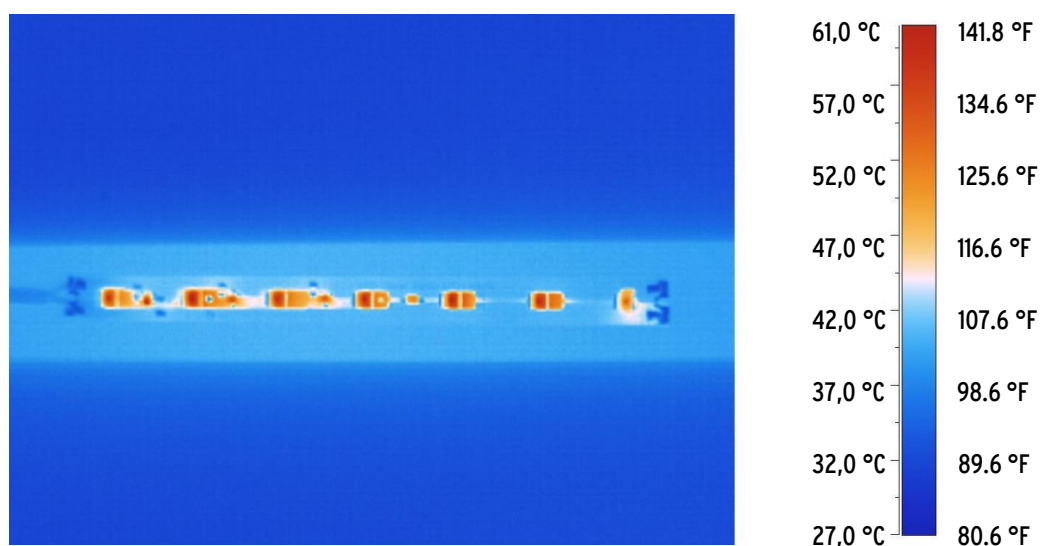| Art.-No.	Description	IP20	IP64	Voltage U_in = [V]	Voltage U_out = [V]	Current of the lamp (s) I = [A] max.	for XOOLUM lamp (s) to P = [W] max
16000081	VarioPSU 24V/20 W IP20 slim	X		220V	24V	0,75 A	18 W
16000082	VarioPSU 24V/35 W IP20 slim	X		220V	24V	1,30 A	31,5 W
16000083	VarioPSU 24V/35 W IP67 slim		X	220V	24V	1,30 A	31,5 W
16000084	VarioPSU 24V/60 W IP20 slim	X		220V	24V	2,25 A	54 W
16000085	VarioPSU 24V/100 W IP20 slim	X		220V	24V	3,75 A	90 W
16000092	VarioPSU 24V/20W IP20; 110V slim	X		110V	24V	0,75 A	18 W
16000093	VarioPSU 24V/28W IP20; 110V slim	X		110V	24V	1.04 A	25 W
16000094	VarioPSU 24V/60W IP20; 110V slim	X		110V	24V	2,25 A	54 W
16000095	VarioPSU 24V/80W IP20; 110V slim	X		110V	24V	3.00 A	72 W
16000123	VarioPSU 24V/80W IP20; 100 - 277V slim	X		100-277V	24V	3,00 A	72 W
16000060	VarioPSU 24V/30W IP64 white		X	90-305V	24V	1,13 A	27 W
16000062	VarioPSU 24V/60W IP67, 1 - 10V silver		X	90-305V	24V	2.25 A	54 W
16000065	VarioPSU 24V/100W IP67, 1 - 10 V Silver		X	90-305V	24V	3,75 A	90 W
16000067	VarioPSU 24V/150W IP67, 1-10 V silver		X	90-305V	24V	5,62 A	135 W
16000069	VarioPSU 24V/240W IP67, 1 - 10 V silver		X	90-305V	24V	9,00 A	216 W
16000088	VarioPSU 24V/320W IP67, 1 - 10 V silver		X	90-305V	24V	12,00 A	288 W
16000070	VarioPSU 24V/12W IP20 white	X		100-240V	24V	0,45 A	10,8 W
16000071	VarioPSU 24V/20W IP20 white	X		100-240V	24V	0,75 A	18 W
16000072	VarioPSU 24V/36W IP20 black	X		100-240V	24V	1,35 A	32,4 W
16000074	VarioPSU 24V/60W IP20 white	X		220-240V	24V	2,25 A	54 W
16000075	VarioPSU 24V/100W IP20 black	X		220-240V	24V	3,75 A	90 W

Safety information

The luminaires of the brand LED Linear, are luminaires of protection class II or protection class III. This means that the protection is not based solely on basic insulation, but additional or reinforced insulation is provided or no protective conductor connection is available.

Please remember that it is absolutely necessary to break the mains voltage before beginning any installation, inspection, maintenance or cleaning of the luminaire. Installation and maintenance of the lamp shall only be carried out by trained personnel with adequate professional qualifications in accordance with the latest electrical installation and safety regulations. For the installation and operation of this luminaire, national safety regulations must be considered. The manufacturer accepts no liability for any damage caused by improper use or installation. If modifications are made to the luminaire, the person responsible for the modification, shall be considered as manufacturer. In case of malfunctions or failure of the luminaire, please contact LED Linear GmbH.

Thermal management and lifetime

The biggest enemy of an LED in the planned operation are high temperatures. These have a strong effect on the lumen output, the color consistency, the lifetime and the efficiency of the LED module. The goal of thermal management is to deliver the generated heat as quickly as possible to the environment.

Realizing this, we developed the established TJ-Away (thermal junction away) printed circuit board technology, which removes the evolving heat optimally. In the construction of XOOLUM™ special attention was paid to the thermal optimization of the luminaire in order to be able to use even our most powerful LEDs. The resulting heat is emitted by TJ-away to the anodized aluminum profile, however, removed from the profile itself to the environment. As a result, overheating of the LEDs is eliminated and the optimal operation of the luminaire is guaranteed.

61,0 °C	141.8 °F
57,0 °C	134.6 °F
52,0 °C	125.6 °F
47,0 °C	116.6 °F
42,0 °C	107.6 °F
37,0 °C	98.6 °F
32,0 °C	89.6 °F
27,0 °C	80.6 °F

The specified luminous flux of the LEDs drops at a temperature change of 100 °C (212 °F) to less than one half. The cooler an LED is operated, the more efficiently it operates. Be assured that the specified LED Linear lumen currents of the individual products are measured exclusively in a thermally stable state.

The life of our XOOLUM™ is 60,000 hours @ L80. This means that after an operating time of 60,000 hours 80% of the original lumen stream are still available. LED semiconductor chips are subject to natural degradation, which will be described here with the index L80.

Installation instruction

A separate installation instruction for XOOLUM™ will be available in the download area of our website soon.
Please check: www.led-linear.com/downloads

XOOLUM™

Without reflector in IP40 and IP67

	Voltage	Watt/m (Watt/ft)	Lumen/m (Lm/ft) @W850	CRI	Lifetime in h @ L80
XOOLUM™ HYDRA HD6 IP40	24 V	6,0 (1.83)	725 (221)	85	>60,000*
XOOLUM™ HYDRA HD6 IP40 (CRI >90)	24 V	6,0 (1.83)	446 (136)	90	>60,000*
XOOLUM™ HYDRA HD10 IP40	24 V	10,0 (3.05)	1.075 (328)	85	>60,000*
XOOLUM™ HYDRA HD10 IP40 (CRI>90)	24 V	10,0 (3.05)	683 (208)	90	>60,000*
XOOLUM™ HYDRA HD15 IP40	24 V	15,4 (4.70)	1.595 (486)	85	>60,000*
XOOLUM™ HYDRA HD25 IP40	24 V	25,0 (7.62)	2.439 (743)	85	>60,000*
XOOLUM™ HYDRA HD36 IP40	24 V	36,0 (10.98)	3.412 (1,040)	85	>60,000*
XOOLUM™ ATON IQ White IP40	24 V	15,4 (4.70)	735 (224)	85	>50,000
XOOLUM™ ATON Color R IP40	24 V	8,0 (2.44)	117 (36)	-	>50,000
XOOLUM™ ECO HD8 B IP40	24 V	8,0 (2.44)	142 (43)	-	>60,000*
XOOLUM™ RGB IP40	24 V	20,0 (6.10)	686 (209)	-	>30,000
XOOLUM™ HYDRA HD6 IP67	24 V	6,0 (1.83)	564 (172)	85	>60,000*
XOOLUM™ HYDRA HD10 IP67	24 V	10,0 (3.05)	844 (257)	85	>60,000*
XOOLUM™ HYDRA HD15 IP67	24 V	15,4 (4.70)	1.241 (378)	85	>60,000*
XOOLUM™ HYDRA HD25 IP67	24 V	25,0 (7.62)	1.897 (578)	85	>60,000*
XOOLUM™ ATON IQ White IP67	24 V	15,4 (4.70)	525 (160)	85	>50,000
XOOLUM™ ATON Color R IP67	24 V	8,0 (2.44)	87 (27)	-	>50,000
XOOLUM™ RGB IP67	24 V	20,0 (6.10)	533 (163)	-	>30,000

With reflector in IP40 and IP67

	Voltage	Watt/m (Watt/ft)	Lumen/m (Lm/ft) @W850	CRI	Lifetime in h @ L80
XOOLUM™ R HYDRA LD15	24 V	15,0 (4.70)	2.100 (640)	85	>60,000*
XOOLUM™ R HYDRA LD25	24 V	25,0 (7.62)	3.274 (998)	85	>60,000*
XOOLUM™ R HYDRA LD40	24 V	40,0 (12.20)	4.015 (1,224)	85	>60,000*
XOOLUM™ R HYDRA LD15 IP67	24 V	15,0 (4.70)	1.666 (508)	85	>60,000*
XOOLUM™ R HYDRA LD25 IP67	24 V	25,0 (7.62)	2.598 (792)	85	>60,000*

More information about the product and the order can be found in the system catalogue 2014/2015 from page 306 or in the XOOMINAIRE catalogue from page 236.

* Compared to the life specifications indicated in the system catalogue 2014/2015, you see the updated values based on the latest LM-80 reports with 10,000 hours of testing in this application note.
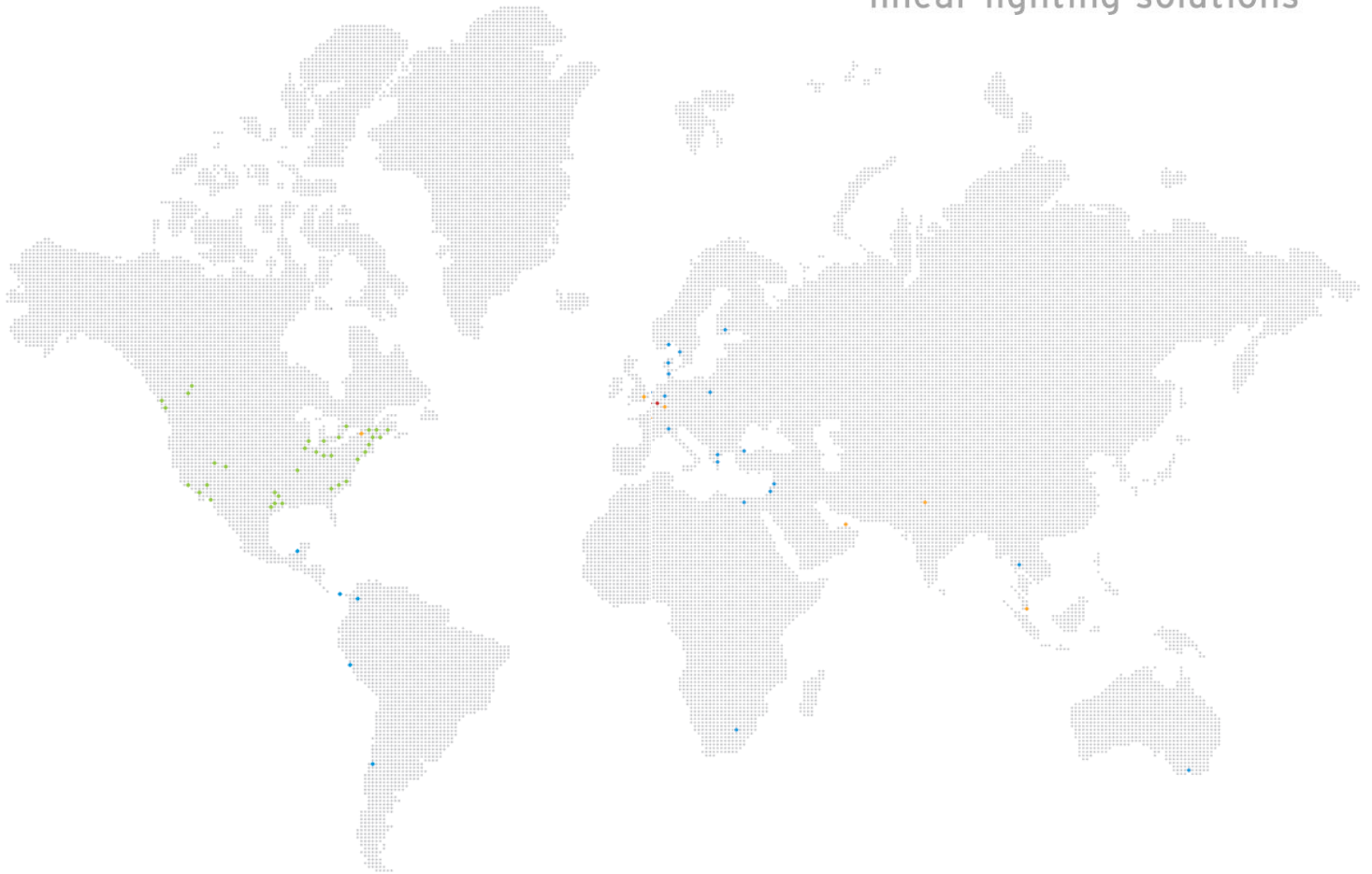
- The smallest Wallwasher on earth

- Up to 133 lm/W luminaire efficiacy

- Up to 4.015 lm/m (1.224 lm/ft). So small and so much light!

- 7 different optics, unique modularity

- Allrounder: From the chief office to the production hall applicable

System Catalogue 2014/2015

XOOMINAIRE catalogue 2014

Free configurable linear luminaires

Linear luminaire family in standard lenghts